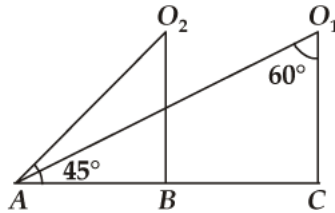


- Q1.** What is the angle of elevation of the Sun when the length of the shadow of a vertical pole is equal to its height?
- Q2.** If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$ what is the angle of elevation of the Sun?
- Q3.** The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$. The angle of elevation of the sun is
(a) 30° (b) 45° (c) 60° (d) 90°
- Q4.** If the angle of elevation of a tower from a distance of 100 metres from its foot is 60° , then the height of the tower is
(a) $100\sqrt{3}$ m (b) $\frac{100}{\sqrt{3}}$ m (c) $50\sqrt{3}$ m (d) $\frac{200}{\sqrt{3}}$ m
- Q5.** If the angles of elevation of a tower from two points distant a and b ($a > b$) from its foot and in the same straight line from it are 30° and 60° , then the height of the tower is
(a) $\sqrt{a+b}$ (b) \sqrt{ab} (c) $\sqrt{a-b}$ (d) $\sqrt{\frac{a}{b}}$
- Q6.** If the angles of elevation of the top of a tower from two points distant a and b from the base and in the same straight line with it are complementary, then the height of the tower is
(a) ab (b) \sqrt{ab} (c) $\frac{a}{b}$ (d) $\sqrt{\frac{a}{b}}$
- Q7.** If the angle of elevation of a cloud from a point 200 m above a lake is 30° and the angle of depression of its reflection in the lake is 60° , then the height of the cloud above the lake, is
(a) 200 m (b) 500 m (c) 30 m (d) 400 m
- Q8.** From the top of a cliff 25 m high the angle of elevation of a tower is found to be equal to the angle of depression of the foot of the tower. The height of the tower is
(a) 25 m (b) 50 m (c) 75 m (d) 100 m
- Q9.** The tops of two poles of height 20 m and 14 m are connected by a wire. If the wire makes an angle of 30° with horizontal, then the length of the wire is
(a) 12 m (b) 10 m (c) 8 m (d) 6 m
- Q10.** A tower subtends an angle of 30° at a point on the same level as its foot. At a second point h metres above the first, the depression of the foot of the tower is 60° . The height of the tower is
(a) $\frac{h}{2}$ m (b) $\sqrt{3}h$ m (c) $\frac{h}{3}$ m (d) $\frac{h}{\sqrt{3}}$ m
- Q11.** Two persons are a metres apart and the height of one is double that of the other. If from the middle point of the line joining their feet, an observer finds the angular elevation of their tops to be complementary, then the height of the shorter post is
(a) $\frac{a}{4}$ (b) $\frac{a}{\sqrt{2}}$ (c) $a\sqrt{2}$ (d) $\frac{a}{2\sqrt{2}}$

- Q12.** It is found that on walking x meters towards a chimney in a horizontal line through its base, the elevation of its top changes from 30° to 60° . The height of the chimney is
- (a) $3\sqrt{2}x$ (b) $2\sqrt{3}x$ (c) $\frac{\sqrt{3}}{2}x$ (d) $\frac{2}{\sqrt{3}}x$
- Q13.** The angle of depression of a car parked on the road from the top of a 150 m high tower is 30° . The distance of the car from the tower (in metres) is
- (a) $50\sqrt{3}$ (b) $150\sqrt{3}$ (c) $150\sqrt{2}$ (d) 75
- Q14.** A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60° with the wall, then the height of the wall is
- (a) $15\sqrt{3}$ m (b) $\frac{15\sqrt{3}}{2}$ m (c) $\frac{15}{2}$ m (d) 15 m
- Q15.** The length of depression of a car, standing on the ground, from the top of a 75 m tower, is 30° . The distance of the car from the base of the tower (in metres) is
- (a) $25\sqrt{3}$ (b) $50\sqrt{3}$ (c) $75\sqrt{3}$ (d) 150
- Q16.** The length of shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of Sun is
- (a) 45° (b) 30° (c) 60° (d) 90°
- Q17.** The tops of two poles of height 16 m and 10 m are connected by a wire of length l metres. If the wire makes an angle of 30° with the horizontal, then $l =$
- (a) 26 (b) 16 (c) 12 (d) 10
- Q18.** Two poles are ' a ' metres apart and the height of one is double of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the smaller is
- (a) $\sqrt{2}a$ metres (b) $\frac{a}{2\sqrt{2}}$ metres (c) $\frac{a}{\sqrt{2}}$ metres (d) $2a$ metres
- Q19.** If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at that time is
- (a) 30° (b) 60° (c) 45° (d) 75°
- Q20.** The angle of elevation of the top of a tower at a point on the ground 50 m away from the foot of the tower is 45° . Then the height of the tower (in metres) is
- (a) $50\sqrt{3}$ (b) 50 (c) $\frac{50}{\sqrt{2}}$ (d) $\frac{50}{\sqrt{3}}$
- Q21.** A ladder makes an angle of 60° with the ground when placed against a wall. If the foot of the ladder is 2 m away from the wall, then the length of the ladder (in metres) is
- (a) $\frac{4}{\sqrt{3}}$ (b) $4\sqrt{3}$ (c) $2\sqrt{2}$ (d) 4
- Q22.** A tower is $100\sqrt{3}$ metres high. Find the angle of elevation if its top from a point 100 metres away from its foot.
- Q23.** Find the angle of elevation of the Sun (Sun's altitude) when the length of the shadow of a vertical pole is equal to its height.
- Q24.** An observer, 1.5 m tall, is 28.5 m away from a tower 30 m high. Determine the angle of elevation of the top of the tower from his eye.

Q25. In figure, what are the angles of depression from the observing positions O_1 and O_2 of the object at A ?

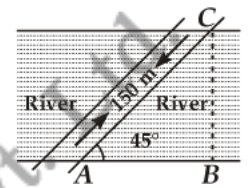


Q26. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string assuming that there is no slack in the string.

Q27. The string of a kite is 100 metres long and it makes an angle of 60° with the horizontal. Find the height of the kite, assuming that there is no slack in the string.

Q28. A tower stands vertically on the ground. From a point on the ground, 20 m away from the foot of the tower, the angle of elevation of the top of the tower is 60° . What is the height of the tower?

Q29. A bridge across a river makes an angle of 45° with the river bank as shown in figure. If the length of the bridge across the river is 150 m, what is the width of the river?



Q30. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground level is 30° .

Q31. A ladder is placed along a wall of a house such that its upper end is touching the top of the wall. The foot of the ladder is 2 m away from the wall and the ladder is making an angle of 60° with the level of the ground. Determine the height of the wall.

Q32. A kite is flying at a height of 75 metres from the ground level, attached to a string inclined at 60° to the horizontal. Find the length of the string to the nearest metre.

Q33. The shadow of a flag-staff is three times as long as the shadow of the flag-staff when the sun rays meet the ground at an angle of 60° . Find the angle between the sun rays and the ground at the time of longer shadow.

Q34. From the top of a hill, the angles of depression of two consecutive kilometre stones due east are found to be 30° and 45° . Find the height of the hill.

Q35. A tree is broken by the wind. The top struck the ground at an angle of 30° and at a distance of 30 metres from the root. Find the whole height of the tree.

Q36. A person, standing on the bank of a river, observes that the angle subtended by a tree on the opposite bank is 60° . When he retreats 20 m from the bank, he finds the angle to be 30° . Find the height of the tree and the breadth of the river.

Q37. A tree 12 m high, is broken by the wind in such a way that its top touches the ground and makes an angle 60° with the ground. At what height from the bottom the tree is broken by the wind?

Q38. An aeroplane at an altitude of 1200 metres finds that two ships are sailing towards it in the same direction. The angles of depression of the ships as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two ships.

Q39. An aeroplane at an altitude of 200 metres observes the angles of depression of opposite points on the two banks of a river to be 45° and 60° . Find the width of the river.

Q40. The shadow of a tower, when the angle of elevation of the sun is 45° , is found to be 10 m longer than when it was 60° . Find the height of the tower.

- Q41.** A person observed the angle of elevation of the top of a tower as 30° . He walked 50 m towards the foot of the tower along level ground and found the angle of elevation of the top of the tower as 60° . Find the height of the tower.
- Q42.** A vertically straight tree, 15 m high, is broken by the wind in such a way that its top just touches the ground and makes an angle of 60° with the ground. At what height from the ground did the tree break?
- Q43.** The length of a string between a kite and a point on the ground is 90 metres. If the string makes an angle θ with the ground level such that $\tan \theta = 15/8$, how high is the kite? Assume that there is no slack in the string.
- Q44.** The horizontal distance between two towers is 140 m. The angle of elevation of the top of the first tower when seen from the top of the second tower is 30° . If the height of the second tower is 60 m, find the height of the first tower.
- Q45.** A vertical tower stands on a horizontal plane and is surmounted by a flag-staff of height 7 m. From a point on the plane, the angle of elevation of the bottom of the flag-staff is 30° and that of the top of the flag-staff is 45° . Find the height of the tower.
- Q46.** From a point P on the ground the angle of elevation of a 10 m tall building is 30° . A flag is hoisted at the top of the building and the angle of elevation of the top of the flag-staff from P is 45° . Find the length of the flag-staff and the distance of the building from the point P . (Take $\sqrt{3} = 1.732$)
- Q47.** On the same side of a tower, two objects are located. When observed from the top of the tower, their angles of depression are 45° and 60° . If the height of the tower is 150 m, find the distance between the objects.
- Q48.** A man on the deck of a ship is 10 m above the water level. He observes that the angle of elevation of the top of a cliff is 45° and the angle of depression of the base is 30° . Calculate the distance of the cliff from the ship and the height of the cliff.
- Q49.** If the angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Find the height of the tower.
- Q50.** The angle of elevation of the top of a vertical tower PQ from a point X on the ground is 60° . At a point Y , 40 m vertically above X , the angle of elevation of the top is 45° . Calculate the height of the tower.
- Q51.** From the top of a 50 m high tower, the angles of depression of the top and bottom of a pole are observed to be 45° and 60° respectively. Find the height of the pole.
- Q52.** The angle of elevation of the top of a tower at a point of the ground is 30° . What will be the angle of elevation, if the height of the tower is tripled.
- Q53.** The tops of two towers of height x and y , standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$.
- Q54.** As observed from the top of a 150 m tall light house, the angles of depression of two ships approaching it are 30° and 45° . If one ship is directly behind the other, find the distance between the two ships.
- Q55.** A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height 5 metres. At a point on the plane, the angles of elevation of the bottom and the top of the flag-staff are respectively 30° and 60° . Find the height of the tower.
- Q56.** A vertical tower stands on a horizontal plane and is surmounted by vertical flag-staff. At a point on the plane 70 metres away from the tower, an observer notices that the angles of elevation of the top and the bottom of the flag-staff are respectively 60° and 45° . Find the height of the flag-staff and that of the tower.

- Q57.** There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on two banks and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30° and 45° , find the height of angles of elevation of the top of the tree.
- Q58.** The angle of elevation of the top Q of a vertical tower from a point X on the ground is 60° . At a point Y , 40 m vertically above X , the angle of elevation is 45° . Find the height of the tower PQ and the distance XQ .
- Q59.** A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60° . When he moves 40 metres away from the bank, he find the angle of elevation to be 30° . Find the height of the tree and the width of the river.
- Q60.** Determine the height of a mountain if the elevation of its top at an unknown distance from the base is 30° and at a distance 10 km further off from the mountain, along the same line, the angle of elevation is 15° . (Use $\tan 15^\circ = 0.27$)
- Q61.** The shadow of a vertical tower on level ground increases by 10 metres, when the altitude of the sun changes from angle of elevation 45° to 30° . Find the height of the tower, correct to one place of decimal. (Take $\sqrt{3} = 1.73$)
- Q62.** At a point on level ground, the angle of elevation of a vertical tower is found to be such that its tangent is $5/12$. On walking 192 metres towards the tower, the tangent of the angle of elevation is $3/4$. Find the height of the tower.
- Q63.** A man sitting at a height of 20 m on a tall tree on a small island in the middle of a river observes two poles directly opposite to each other on the two banks of the river and in line with the foot of tree. If the angles of depression of the feet of the poles from a point at which the man is sitting on the tree on either side of the river are 60° and 30° respectively. Find the width of the river.
- Q64.** At the foot of a mountain the elevation of its summit is 45° ; after ascending 1000 m towards the mountain up a slope of 30° inclination, the elevation is found to be 60° . Find the height of the mountain.
- Q65.** A man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with a uniform speed. Six minutes later, the angle of depression of the boat is found to be 60° . Find the time taken by the boat to reach the shore.
- Q66.** The length of the shadow of a tower standing on level plane is found to be $2x$ metres longer when the sun's altitude is 30° than when it was 45° . Prove that the height of tower is $x(\sqrt{3} + 1)$ metres.
- Q67.** An aeroplane flying horizontally 1 km above the ground is observed at an elevation of 60° . After 10 seconds, its elevation is observed to be 30° . If the aeroplane is flying at a height of 3000 metres, find the speed of the aeroplane.
- Q68.** The angle of elevation of an aeroplane from a point on the ground is 45° . After a flight of 15 seconds, the elevation changes to 30° . If the aeroplane is flying at a height of 3000 metres, find the speed of the aeroplane.
- Q69.** The horizontal distance between two trees of different heights is 60 m. The angle of depression of the top of the first tree when seen from the top of the second tree is 45° . If the height of the second tree is 80 m, find the height of the first tree.
- Q70.** A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height h . At a point on the plane, the angles of elevation of the bottom and the top of the flag-staff are α and β respectively. Prove that height of the tower is $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$.
- Q71.** A straight highway leads to the foot of a tower of height 50 m. From the top of the tower, the angles of depression of two cars standing on the highway are 30° and 60° respectively. What is the distance between the two cars and how far is each car from the tower?

- Q72.** The angle of elevation of a stationary cloud from a point 2500 m above a lake is 15° and the angle of depression of its reflection in the lake is 45° . What is the height of the cloud above the lake level? (Use $\tan 15^\circ = 0.268$)
- Q73.** If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$.
- Q74.** Two stations due south of a leaning tower which leans towards the north are at distances a and b from its foot. If α, β be the elevations of the top of the tower from these stations, prove that its inclination θ to horizontal is given by $\cot \theta = \frac{b \cot \alpha - a \cot \beta}{b - a}$.
- Q75.** A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin \beta \operatorname{cosec} \frac{\alpha}{2}$.
- Q76.** A ladder rests against a wall at an angle α to the horizontal. Its foot is pulled away from the wall through a distance a , so that it slides a distance b down the wall making an angle β with the horizontal. Show that $\frac{a}{b} = \frac{\cos \alpha - \cos \beta}{\sin \beta - \sin \alpha}$.
- Q77.** The angle of elevation of a cliff from a fixed point is θ . After going up a distance of k metres towards the top of the cliff at an angle of ϕ , it is found that the angle of elevation is α . Show that the height of the cliff is $\frac{k(\cos \phi - \sin \phi \cot \alpha)}{\cot \theta - \cot \alpha}$ metres.
- Q78.** A tower subtends an angle α at a point A in the plane of its base and the angle of depression of the foot of the tower at a point h metres just above A is β . Prove that the height of the tower is $b \tan \alpha \cot \beta$.
- Q79.** The angles of elevation of the top of a tower from two points at distances a and b metres from the base and in the same straight line with it are complementary. Prove that the height of the tower is \sqrt{ab} metres.
- Q80.** From the top of a light house, the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h metres and the line joining the ships passes through the foot of the light house, show that the distance between the ship is $\frac{h(\tan \alpha + \tan \beta)}{\tan \alpha \tan \beta}$ metres.
- Q81.** As observed from the top of a light house, 100 m above sea level, the angle of depression of a ship, sailing directly towards it, changes from 30° to 45° . Determine the distance travelled by the ship during the period of observation.
- Q82.** Two pillars of equal height and on either side of a road, which is 100 m wide. The angles of elevation of the top of the pillars are 60° and 30° at a point on the road between the pillars. Find the position of the point between the pillars and the height of each pillar.
- Q83.** A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° , how soon after this, will the car reach the tower? Give your answer to the nearest second.
- Q84.** The angle of elevation of a jet plane from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the jet plane is flying at a constant height of $3600\sqrt{3}$ metres, find the speed of the jet plane.
- Q85.** A man standing on the deck of a ship, which is 0 m above water level. He observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Calculate the distance of the hill from the ship and the height of the hill.

- Q86.** From the top of a building 60 m high the angles of depression of the top and the bottom of a tower are observed to be 30° and 60° . Find the height of the tower.
- Q87.** From a window 15 metres high above the ground in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are 30° and 45° respectively. Show that the height of the opposite house is 23.66 metres (Take $\sqrt{3} = 1.732$)
- Q88.** The angle of elevation of a cloud from a point 60 m above a lake is 30° and the angle of depression of the reflection of cloud in the lake is 60° . Find the height of the cloud.
- Q89.** From the top of a building 15 m high the angle of elevation of the top of a tower is found to be 30° . From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower and the distance between the tower and building.
- Q90.** The angle of elevation of the top of a tower from a point A on the ground is 30° . On moving a distance of 20 metres towards the foot of the tower to a point B the angle of elevation increases to 60° . Find the height of the tower and the distance between the tower and building.
- Q91.** The angle of elevation of the top of a tower as observed from a point in a horizontal plane through the foot of the tower is 32° . When the observer moves towards the tower a distance of 100 m, he finds the angle of elevation of the top to be 63° . Find the height of the tower and the distance of the first position from the tower. [Take $\tan 32^\circ = 0.6248$ and $\tan 63^\circ = 1.9626$]
- Q92.** The angle of elevation of a tower from a point on the same level as the foot of the tower is 30° . On advancing 150 metres towards the foot of the tower, the angle of elevation of the tower becomes 60° . Show that the height of the tower is 129.9 metres (Use $\sqrt{3} = 1.732$)
- Q93.** An aeroplane when flying at a height of 400 m from the ground passes vertically above another aeroplane at an instant when the angles of the elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant.
- Q94.** The angle of elevation of the top of the building from the foot of the tower is 30° and the angle of the top of the tower from the foot of the building is 60° . If the tower is 50 m high, find the height of the building.
- Q95.** On a horizontal plane there is a vertical tower with a flag pole on the top of the tower. At a point 9 metres away from the foot of the tower the angle of elevation of the top and bottom of the flag pole are 60° and 30° respectively. Find the height of the tower and the flag pole mounted on it.
- Q96.** If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake be β , prove that the distance of the cloud from the point of observation is
$$\frac{2h \sec \alpha}{\tan \beta - \tan \alpha}$$
- Q97.** Two boats approach a light house in mid-sea from opposite directions. The angles of elevation of the top of the light house from two boats are 30° and 45° respectively. If the distance between two boats is 100 m, find the height of the light house.
- Q98.** The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30° . If the tower is 50 m high, what is the height of the hill?
- Q99.** From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β . Show that the height in miles of aeroplane above the road is given by
$$\frac{\tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$$
.
- Q100.** The horizontal distance between two poles is 15 m. The angle of depression of the top of the first pole as seen from the top of the second pole is 30° . If the height of the second pole is 24 m, find the height of the first pole. (Use $\sqrt{3} = 1.72$)

- Q101** The angles of depression of two ships from the top of a light house and on the same side of it are found to be 45° and 30° respectively. If the ships are 200 m apart, find the height of the light house.
- Q102** A flag-staff stands on the top of a 5 m high tower. From a point on the ground, the angle of elevation of the top of the flag-staff is 60° and from the same point, the angle of elevation of the top of the tower is 45° . Find the height of the flag-staff.
- Q103** An aeroplane is flying at a height of 210 m. Flying at this height at some instant the angles of depression of two points in a line in opposite directions on both the banks of the river are 45° and 60° . Find the width of the river (Use $\sqrt{3} = 1.73$)
- Q104** The angle of elevation of the top of a chimney from the top of a tower is 60° and the angle of depression of the foot of the chimney from the top of the tower is 30° . If the height of the tower is 40 m, find the height of the chimney. According to pollution control norms, the minimum height of a smoke emitting chimney should be 100 m. State if the height of the above mentioned chimney meets the pollution norms. What value is discussed in this question?

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